AIR DISPERSION MODELING SUMMARY SHEET

COMPANY/FACILITY:	Santee Cooper Pee Dee Generating Station		
LOCATION (COUNTY):	Kingsburg (Florence)	**DATE:**	12/11/2008
PERMIT NUMBER:	TV-1040-0113	**REVIEWED BY:**	OTP

REASON MODELED:	X	**CONSTRUCTION PERMIT**	____	**CONDITIONAL MAJOR**
	____	**NEW OPERATING PERMIT**	____	**TITLE V PERMIT**
	____	**OPERATING PERMIT RENEWAL**	____	**TITLE V OPFLEX**
	____	**AIR COMPLIANCE DEMO**	X	**PSD MAJOR**
MODELED FOR:	X	**NAAQS**	X	**PSD INCREMENT**
	____	**AIR TOXICS**		
OTHER:	____	**EXEMPTION**	____	**DEFERRAL**
	____	**DE MINIMIS**	No	**COLLOCATED (Yes or No)**

PROJECT DESCRIPTION: South Carolina Public Service Authority, also known as Santee Cooper, is planning to construct a new coal-fired power plant located near Kingsburg, SC. The plant would consist of combustion boiler technology and ancillary equipment to produce steam for the generation of electricity. The project will consist of two pulverized coal boiler, nominal 660 MW or 5,700 million Btu/hr input, each. There will be two 1,500 kW diesel-fired emergency generators, 380 hp fire pump, two multi-cell cooling towers, storage tanks, and coal, petcoke, limestone, and solid waste handling equipment. Emissions from the emergency generators and fire pump were not included since these units operate less than 500 hours/yr.

SUMMARY OF MODELING ANALYSIS & RESULTS: A modeling analysis using the AERMOD program was provided by Trinity Consultants. The Santee Cooper Pee Dee facility will be a greenfield facility. This project will be considered major under Standard 7 PSD. When a “Standard” is mentioned, it implies the application section of South Carolina Regulation 61-62.5, Standards 1 through 8. When “the facility” is used in this summary, it refers to the Santee Cooper Pee Dee facility. A complete summary sheet is included.

For a major facility, PSD regulations require an applicant to analyze the impact from the construction of a proposed new source(s) on the following areas:

1. Compliance with the National and State Ambient Air Quality Standards;
2. Compliance with the PSD Increments;
3. Significant impact on PSD Class I Areas, including Class I PSD increments;
4. Impairments to visibility, soil, and vegetation; and
5. Air Quality impact of general growth associated with the source.

All minor and major sources proposing new construction or construction modifications in South Carolina (SC) are also required to demonstrate that their facility will remain in compliance with South Carolina Regulation 61-62.5 Standards 2 (AAQS), 7 (Class II PSD Increments), and 8 (Air Toxics). General results of this compliance demonstration indicate that there will be no exceedances of Full Impact or South Carolina ambient air quality standards or PSD increments. Refined Class I modeling indicated that there will also be no adverse affects on visibility in any of the Class I areas within 200 km or on vegetation and soils.

This summary sheet is divided into the following sections:
Section A – PSD Significant Determination
Section B – PSD Class II Modeling Analysis (Preliminary and Full Impact)
Section C – PSD Additional Impact Analysis – Visibility, Soils, & Vegetation, Growth and Deposition
Section D – PSD Class I Impact Analysis
Section E – South Carolina (SC) Facility-wide Compliance Demonstration
Section F – Modeled Source (Stack) Parameters & Emission Rates

Acronyms/Abbreviations
AAQS = Ambient Air Quality Standards
AQRV = Air Quality Related Values
BACT = Best Achievable Control Technology
CO = Carbon Monoxide
DAT = Deposition Assessment Threshold values for sulfate and nitrate set by the FLM
FLAG = Federal Land Managers' Air Quality Related Values Workgroup Phase I Report
FLM = Federal Land Manager
FWS = Fish and Wildlife Service
H_2S = Hydrogen Sulfide
H_2SO_4 = Sulfuric Acid Mist
IWAQM = Interagency Workgroup on Air Quality Modeling Phase 2 Report
LBS/HR = pounds per hour
MM = mesoscale meteorological data (i.e. MM4 or MM5)
NAAQS = National Ambient Air Quality Standards
NCDC = National Climatic Data Center
NO_X = Oxides of Nitrogen
NPS = National Park Service
NWR = National Wildlife Refuge
Pb = Lead
PM_{10} = Particulate Matter <10 microns
PSD = Prevention of Significant Deterioration
SA = Screening Area
SC = South Carolina
SIA = Significant Impact Area
SIL = Significant Impact Level
SO_2 = Sulfur Dioxide
Standard 2 = SC State Regulation 61-62.5, Standard 2
Standard 7 = SC State Regulation 61-62.5, Standard 7
Standard 8 = SC State Regulation 61-62.5, Standard 8
TPY = Tons per year
TSP = Total Suspended Particulate
VOC = Volatile Organic Compound

SECTION A - PSD SIGNIFICANT DETERMINATION

The Santee Cooper Pee Dee facility will be a new source. Since this facility is listed in one of the 28 industrial categories defined in Standard 7, the PSD major source threshold is 100 TPY for any NSR (New Source Review) pollutant. Each pollutant increase is compared to this PSD threshold value. If a pollutant exceeds the threshold, the facility is determined to be "major" for PSD and will require a PSD Review. If one pollutant exceeds the threshold value, the remaining pollutants are then compared to the significant levels to determine which other pollutants also require a PSD review. Pollutants not exceeding the PSD significance level will not require a PSD Review, however, they must demonstrate compliance with SC State Regulation 61-62.5, Standards 2, 7, and 8 and guidelines defined for minor sources constructing and operating air emission sources in South Carolina.

Table 1 lists the maximum potential emission rates for this project. Comparison of each pollutant to the respective PSD significance level indicates that TSP, PM_{10}, SO_2, NO_X, CO, VOC/Ozone, Fluorides, Lead, and Sulfuric Acid Mist (H_2SO_4) will require a PSD review to demonstrate compliance with Class II PSD increments (Standard 7) and Ambient Air Quality Standards (AAQS) (Standard 2).

TABLE 1 PREVENTION OF SIGNIFICANT DETERIORATION (PSD) EMISSION RATES			
POLLUTANT	**POTENTIAL EMISSIONS (TONS/YR)**	**PSD SIGNIFICANT EMISSION RATE (TONS/YR)**	**PSD REVIEW REQUIRED? (Yes/ No) (2)**
TSP	984	25	YES (5)
PM_{10}	964	15	YES
SO_2	5992	40	YES
NO_x	3495	40	YES
CO	7989	100	YES
Ozone	--	(1)	YES
Fluorides	17.0	3	YES (4)
Lead	1.0	0.6	YES (4)
H_2S	--	10	NO
H_2SO_4 Mist	250	7	YES (3)
1) Major for VOC's or NO_X is considered major for Ozone			
2) Sources that exceed the significant threshold are required to perform an ambient impact analysis.			
3) The potential emissions for H_2SO_4 exceed the PSD threshold, however, the emissions are from virgin fuel burning and are exempt from Standard 8 modeling analysis.			
4) This pollutant exceeds the PSD significance level, however, there are no significant impact levels to determine if a full impact analysis is required. These pollutants are addressed in the Standard 2 and 7 modeling analysis and the additional impacts analysis.			
5) Although TSP exceeds the PSD significance level, there is no NAAQS value for comparison. This pollutant is addressed in the Standard 2 modeling analysis.			

SECTION B - PSD CLASS II MODELING ANALYSIS

The PSD Review requires pollutants, which are determined to be "major", be evaluated by an Air Quality Impact Analysis and Additional Impacts Analysis. The Air Quality Impact Analysis consists of (1) a Preliminary Modeling Analysis to determine which pollutants from the proposed project, at the **facility only,** exceed their Class II Significant Impact Levels (SIL); and (2) a more comprehensive Full Impact Analysis based on concentrations of pollutants exceeding the SIL for the facility and additional 'facility-wide' impacts from other facilities that may impact the Significant Impact Area (SIA) or Screening Area (SA). The Additional Impacts Analysis evaluates the impacts on soils, vegetation, and visibility effects, especially on Class I areas.

B.1. PSD CLASS II PRELIMINARY MODELING ANALYSIS

Potential emission rates or net emission rate increases for each pollutant determined to be significant (Table 1) at the facility were modeled to determine (a) the Significant Impact Level (SIL); (b) the impact area within which a Full Impact Analysis must be performed; and (c) whether or not the facility may be exempted from the ambient monitoring data requirements. Each of these three preliminary Class II analyses is discussed below.

B.1.a. SIGNIFICANT IMPACT LEVEL (SIL) ANALYSIS

If an SIL is not exceeded, then no further analysis is required. Table 2 provides the results of the SIL modeling analysis for this project, which shows SIL's were exceeded for SO_2 and PM_{10} for each respective averaging period. Therefore, a Full Impact analysis was required for these pollutants. No further PSD analysis is required for CO and NOx, however, these must be included in the Standard 2 and 7 state modeling. Full Impact analysis assesses the combined impacts of the significant impact pollutants from the facility sources along with those from other sources in the Significant Impact Area (SIA) and the Screening Area as appropriate.

TABLE 2
CLASS II PREVENTION OF SIGNIFICANT DETERIORATION (PSD) SIGNIFICANT IMPACT LEVEL & SIGNIFICANT MONITORING CONCENTRATION

POLLUTANT	AVERAGING TIME	MODEL USED	MAXIMUM IMPACT ($\mu g/m^3$)	SIL ($\mu g/m^3$)	EXCEEDS SIL (Yes/No)	SIGNIFICANT IMPACT AREA (km)	SIGNIFICANT MONITORING CONCENTRATION ($\mu g/m^3$)
PM_{10}	24 HOUR	AERMOD	33.7	5	YES	2.6	10
	ANNUAL	AERMOD	5.2	1	YES	2.2	N/A
SO_2	3 HOUR (1)	AERMOD	75.1	25	YES	18.0	N/A
	24 HOUR (2)	AERMOD	13.8	5	YES	7.8	13
	ANNUAL (2)	AERMOD	1.6	1	YES	3.1	N/A
NO_X	ANNUAL	AERMOD	0.9	1	NO	N/A	14
CO	1 HOUR	AERMOD	70.5	2000	NO	N/A	N/A
	8 HOUR	AERMOD	39.8	500	NO	N/A	575
Maximum concentrations are used for the Significant Impact Level analysis (i.e. First High).							
1) Based on a 3-hour emission rate of 0.24 lb/MMBtu.							
2) Based on a 24-hour emission rate of 0.12 lb/MMBtu.							
Ozone is not modeled, but a general impact assessment is to be made if the source is major for ozone as determined in Table 1.							
There is no SIL for fluorides, lead, H_2S, and H_2SO_4. TSP is not considered a criteria pollutant for this analysis.							

The Southeastern United States, including South Carolina, is NO_X limited with regards to ozone formation. This means that there is an excess of VOC in the atmosphere with regards to ozone formation and increases in VOC do not lead to increases in ozone production. The excess VOC is in part due to natural sources in the environment. Due to the excess VOC, only increases in NO_X in this region are a concern with regards to ozone formation. Ambient impacts from NO_X are addressed in NO_X modeling. The current 8-hour ozone design value at the nearest monitor to the proposed facility (Pee Dee, Darlington) shows attainment. Since the VOC emissions are not expected to impact these levels, a formal analysis of impacts was not completed.

Table 3 provides a summary of the maximum and average potential emission rates of each pollutant included in dispersion modeling to determine significant impact concentrations for the facility only. Emission rates (average or maximum) used to determine long-term (24-hr & annual) and short-term (<24 hour) impacts are identified by footnotes to Table 3. As shown in Table 3, total maximum and total average emission rates for each pollutant exceed the respective PSD Significant Emission Rate Thresholds previously identified in Table 1. A detailed listing of dispersion parameters for each point, volume, and area source included in the SIL analysis, as well as respective emission rates, is included in Section F, Source (Stack) Dispersion Parameters & Modeled Emission Rates.

TABLE 3
SIGNIFICANT IMPACT LEVEL
MODELED EMISSION RATE TOTALS

	SHORT-TERM (lb/hr) (1)	LONG-TERM (lb/hr) (2)	LONG-TERM (TPY) (2)
PM_{10}	220	220	964
SO_2	2736	1368	5992
NO_X	(3)	798	3495
CO	1824	(4)	(4)

1) Maximum emission rates were used for short-term (<24 hr) modeling for SO_2 and CO
2) Average emission rates were used for long-term (24 hr & annual) modeling for PM_{10}, SO_2 and NO_x.
3) NO_x has no short-term averaging period (Annual impact only).
4) CO has no long-term averaging period (1 and 8 hour only)

B.1.b. SIGNIFICANT IMPACT AREA (SIA) ANALYSIS
Sources within a radius of the facility that is equal to the farthest location where the predicted ambient impact of a pollutant from the project exceeds the Class II SIL, or 50 km, whichever is less, shall be used. An impact area is initially established for each pollutant for every averaging time. Table 2 indicates that the maximum distances to significant impacts are 2.6 km for PM_{10}, 7.8 km for the SO_2 24hr period, and 18.0 km for the SO_2 3hr averaging period. For this project, a SIA was set at 50 km, and all sources within the 50 km radius were included. This is a conservative analysis.

B.1.c. SIGNIFICANT MONITORING CONCENTRATION ANALYSIS
Modeling significance results for SO_2, PM_{10}, NO_X, and CO are shown below along with significant monitoring concentrations for these pollutants. The significant monitoring concentrations are from SC Regulation 61-62.5, Standard No. 7. Impacts are the maximum modeled concentrations for each pollutant (i.e. Highest First High).

Pollutant	Averaging Period	Max. Impact ($\mu g/m^3$)	Significant Monitoring Concentration ($\mu g/m^3$)	Exceeds (Y or N)
SO_2	24-Hour	13.8	13	Y
PM_{10}	24-Hour	33.7	10	Y
NO_x	Annual	0.9	14	N
CO	8-Hour	39.8	575	N

The maximum impact for NO_X and CO are below the significant monitoring concentration (SMC) levels of 14 and 575 ug/m^3, therefore, no pre-construction monitoring is required. The SO_2 and PM_{10} concentrations exceed the SMC. Since this site can potentially emit greater than 100 tons per year of VOCs, ozone monitoring data also needs to be reviewed. Section 2.4 of U.S. EPA's *Ambient Monitoring Guidelines for Prevention of Significant Deterioration* (EPA-450/4-87-007) permits the use of existing representative air quality data in place of preconstruction monitoring data, provided monitor location, quality of data, and currentness of data are acceptable. There are no existing monitors in the modeled domain. The proposed area for the site is an area that is generally free from the impact of other point sources and area sources associated with human activities. Additionally, the site is located in an area with no complex terrain. According to the EPA document listed above, monitoring data from a regional site may be used as representative data in these cases. The nearest regional monitors for the Pee Dee site for SO_2 and PM_{10} are located in Georgetown, South Carolina. Ozone monitoring data is available from the Indiantown site in Williamsburg County. These monitors are operated by the SC DHEC in support of National Ambient Air Quality Standards attainment activities and meet the quality assurance requirements for this work. The Georgetown monitoring data will provide conservative background data for the Pee Dee site as Georgetown has numerous industrial sources that impact these monitors. The Indiantown site is a rural monitoring site similar to the Pee Dee site. As noted above, SC DHEC operates these monitors in support of their attainment activities. These activities require the data to be quality assured. The level of quality assurance for these monitors meet the requirements for pre-construction monitoring.

Therefore, it has been determined that the data DHEC has obtained for background concentrations are representative of the ambient pollutant concentrations in the area of the proposed facility. In accordance with Chapter C, Section III of the New Source Review Manual (Draft document, dated October 1990), the Bureau approves the use of ambient data collected at DHEC monitoring stations for pre-construction monitoring requirements, thus any further Significant Monitoring Concentration analysis is not required for this project.

B.2. PSD CLASS II FULL IMPACT MODELING ANALYSIS

A Full Impact Analysis is required for any pollutant for which the proposed source's estimated ambient pollutant concentrations exceed the SIL's (determined in Table 2). Separate analyses are performed for determining compliance with the NAAQS and PSD increments. The NAAQS analysis must also include background pollutant concentrations. The Full Impact Analysis consists of modeling all facilities within the SIA, and those in the SA, which were not excluded by the screening protocol. The SA is usually an area extending 50 km beyond the SIA. The "Screening Threshold Method for PSD Modeling" or "20D Rule" was used to determine which sources within the Screening Area to include.

In order to exclude a source, the annual emissions of a pollutant must be less than 20 times the distance (km) from the SIA to the source for each facility inside the screening area. Each calculated 20D distance was compared to the annual emission of each pollutant. Those sources with annual emissions greater than or equal to 20D were retained and considered in both the Full Impact modeling analysis for the Class II NAAQS analysis and the Class II PSD Increment analysis.

Example Calculation:
Q (tpy) < 20 * D(km)
Q = total annual emissions for source being evaluated for inclusion (each pollutant must be addressed)
D = distance from the SIA boundary to the facility considered for inclusion
Where:
$D = [(x_1 - x_2)^2 + (y_1 - y_2)^2]^{½} - R$
R = distance from the PSD Source to the edge of the SIA, or 50km, whichever is less
x_1, y_1 = coordinates of the source being considered for inclusion (km)
x_2, y_2 = coordinates of the PSD Source (km)

For this project, the facility initially included sources between 50 and 65 km in the Screening Analysis. The determined SIA was originally 7.8 km, so the Screening Area would be from 7.8 to 57.8 km. Since the facility has already included all sources out to 50 km, this was a conservative approach. However, the facility decided to increase the allowable permitted short-term SO_2 3-hr rate, which increased the SIA out to 18.0km, thereby increasing the SA out to 68 km for the SO_2 3-hr averaging period only. This caused additional sources between 57.8 and 68 km to be included in the SA area for the SO_2 3-hr period. There was no change to the SIA inventory since it was already extended out to 50km.

B.2.a. PSD CLASS II FULL IMPACT – NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) ANALYSIS

Table 4 shows a list of facilities that are included in the full impact analysis for NAAQS modeling.

TABLE 4 CLASS II FULL IMPACT ANALYSIS - NAAQS SIA AND 20D SOURCES			
PM_{10}	SO_2	NO_X	CO
Darlington Veneer	Nucor Steel Darlington	N/A	N/A
Wellman, Inc. - Darlington	Hartsville Oil Mill	N/A	N/A
HRS Textiles, Inc.	Wellman, Inc. - Darlington	N/A	N/A
Chesterfield Lumber	HRS Textiles, Inc.	N/A	N/A
PowerSecure, Inc.	PowerSecure, Inc.	N/A	N/A
Lockamy Scrap Metal	Paperboard Industries Corp.	N/A	N/A
Paperboard Industries Corp.	Stone Container	N/A	N/A
Talon, Inc.	Carter Manufacturing	N/A	N/A
A.C. Monk	Wellman – Florence	N/A	N/A
Stone Container	Tyler Plywood Corporation	N/A	N/A
Carter Manufacturing	Koppers Industries	N/A	N/A
Wellman – Florence	Marsh Lumber Company	N/A	N/A
Tyler Plywood Corporation	The ESAB Group	N/A	N/A
Koppers Industries	Dupont-Florence	N/A	N/A
Marsh Lumber Company	Charles Ingram Lumber Co	N/A	N/A
The ESAB Group	La-Z-Boy East	N/A	N/A
Dupont-Florence	McLeod Regional Medical Center	N/A	N/A
Charles Ingram Lumber Co	Sara Lee Hosiery	N/A	N/A
La-Z-Boy East	Asea Brown Boveri	N/A	N/A
McLeod Regional Medical	Vulcraft-Div. of Nucor	N/A	N/A

TABLE 4 CLASS II FULL IMPACT ANALYSIS - NAAQS SIA AND 20D SOURCES			
Center			
Sara Lee Hosiery	Maytag Florence Operations	N/A	N/A
Asea Brown Boveri	McCall Farms	N/A	N/A
Vulcraft-Div. of Nucor	Roche Carolina	N/A	N/A
Maytag Florence Operations	Florence Wastewater Treatment	N/A	N/A
Nan Ya Plastics	Francis Marion University	N/A	N/A
McCall Farms	Carolinas Hospital System	N/A	N/A
Roche Carolina	Honda	N/A	N/A
Florence Wastewater Treatment	Duquesne Energy	N/A	N/A
Francis Marion University	Southern Impressions, LLC	N/A	N/A
Carolinas Hospital System	Gatewood Products, LLC	N/A	N/A
Honda	Crenlo, Inc	N/A	N/A
Duquesne Energy	Flav-O-Rich	N/A	N/A
Southern Impressions, LLC	International Paper - Pulp & Paper Mill	N/A	N/A
Gatewood Products, LLC	Georgetown Steel, Inc.	N/A	N/A
Crenlo, Inc	Santee Cooper – Winyah	N/A	N/A
Flav-O-Rich	Oneita Industries	N/A	N/A
International Paper - Pulp & Paper Mill	Santee Cooper-Grainger Station	N/A	N/A
Georgetown Steel, Inc.	PPM Cranes, Inc.	N/A	N/A
International Paper - Sampit Lumber	Wolverine Brass, Inc.	N/A	N/A
Santee Cooper-Grainger Station	Embers Charcoal Company	N/A	N/A
PPM Cranes, Inc.	Santee Cooper - Myrtle Beach	N/A	N/A
Wolverine Brass, Inc.	Uniblend Spinners	N/A	N/A
Embers Charcoal Company	NewSouth, Inc.	N/A	N/A
Santee Cooper - Myrtle Beach	Conway Hospital	N/A	N/A
Uniblend Spinners	Allied Signal Metglas Products	N/A	N/A
NewSouth, Inc.	Grand Strand WW treatment plant	N/A	N/A
Conway Hospital	Horry Co. SWA	N/A	N/A
Allied Signal Metglas Products	Santee Cooper Horry Co. Landfill	N/A	N/A
Horry County	Fabric Resources Intl. Ltd.	N/A	N/A
Grand Strand WW treatment plant	Cone Mills-Raytex Finishing	N/A	N/A
Bayshore Concrete Products	International Paper	N/A	N/A
Horry Co. SWA	Pilliod Furniture	N/A	N/A
Santee Cooper Horry Co. Landfill	Marion Memorial Hospital	N/A	N/A
Fabric Resources Intl. Ltd.	Blumenthal Mills, Inc.	N/A	N/A
Cone Mills-Raytex Finishing	Mullins Hospital	N/A	N/A
International Paper	Marion Ceramics	N/A	N/A
Pilliod Furniture	Piggly Wiggly #54	N/A	N/A
Marion Memorial Hospital	Russell Stover Candy	N/A	N/A
Blumenthal Mills, Inc.	SO-PAK-CO, INC.	N/A	N/A
Mullins Hospital	Wellman, Inc. – Marion	N/A	N/A
AVM of South Carolina	Sara Lee Hosiery	N/A	N/A
Marion Ceramics	Heritage Sportswear	N/A	N/A

TABLE 4 CLASS II FULL IMPACT ANALYSIS - NAAQS SIA AND 20D SOURCES			
Piggly Wiggly #54	Marion Co. Medical Center	N/A	N/A
Russell Stover Candy	Forest Industries International, Inc.	N/A	N/A
SO-PAK-CO, INC.	Mohawk Carpets - Oak River Mill	N/A	N/A
Wellman, Inc.	Martek	N/A	N/A
Sara Lee Hosiery	Colonial Rubber	N/A	N/A
Heritage Sportswear	Williamsburg Co. Mem. Hospital	N/A	N/A
Marion Co. Medical Center	Burns Philp Food	N/A	N/A
Forest Industries International, Inc.	Firestone Building Products	N/A	N/A
Martek	Milliken-Kingstree Plant	N/A	N/A
Colonial Rubber	Nan Ya Plastics	N/A	N/A
Williamsburg Co. Mem. Hospital		N/A	N/A
Burns Phillip Food		N/A	N/A
Don's Scrap Iron & Metal, Inc.		N/A	N/A
Firestone Building Products		N/A	N/A
Milliken-Kingstree Plant		N/A	N/A
Nan Ya Plastics		N/A	N/A

Table 5 shows that when proposed facility emissions are modeled with other sources in the SIA and SA and background values are added, the National Ambient Air Quality Standards are not exceeded and compliance has been demonstrated.

Table 5 AMBIENT AIR QUALITY STANDARDS CLASS II FULL IMPACT ANALYSIS							
Pollutant	**Averaging Time**	**Model Used**	**Maximum Modeled Concentration ($\mu g/m^3$)**	**Background Concentration ($\mu g/m^3$)**	**Total ($\mu g/m^3$)**	**Standard ($\mu g/m^3$)**	**% of Standard**
PM_{10}	24 Hour	AERMOD	28.8	49.0	77.8	150	51.9
	Annual	AERMOD	5.6	23.5	29.1	50	58.2
SO_2	3 Hour	AERMOD	212.4 (1)	146.6	359	1300	27.6
	24 Hour	AERMOD	134.4 (2)	34.0	168.4	365	46.1
	Annual	AERMOD	34.4 (2)	4.7	39.1	80	48.9
Backgrounds are summarized in Table 19.							
The highest-first-high modeled concentrations for the 5 years of Meteorological data are listed for annual averaging periods and the highest second-high for other averaging periods.							
1) Based on 0.24 lb/MM Btu emission rate.							
2) Based on 0.12 lb/MM Btu emission rate.							

Total long-term (24-hr & annual) and short-term (<24 hours) modeled emission rates for the NAAQS Full Impact analysis are summarized below. A detailed listing of dispersion parameters of each source, as well as each respective modeled emission rate included in the Class II NAAQS Full Impact analysis, is included in the facility's application (dated July 2006, May 2007, and additional correspondence) and the corresponding electronic modeling files. Those tables were not re-produced for this summary due to their length.

TABLE 6 FULL IMPACT ANALYSIS MODELED EMISSION RATE TOTALS			
	SHORT-TERM (lb/hr) (1)	LONG-TERM (lb/hr) (2)	LONG-TERM (TPY) (2)
PM_{10}	N/A	3129	13,705
SO_2	34,228	18,490	80,986
1) Maximum emission rates were used for short-term (3-hr) modeling for SO_2			
2) Average emission rates were used for long-term (24 & annual) modeling for PM_{10} and SO_2.			

B.2.b. PSD CLASS II FULL IMPACT - PSD INCREMENT ANALYSIS

The full impact analysis for PSD increment consuming sources is performed in the same manner as the full impact analysis for the NAAQS shown above. The sources included are all increment consuming sources from the facility and those previously identified within the SIA and SA.

Table 7 provides a summary of the facility-wide maximum and average projected emission increases of Standard No. 7 pollutants anticipated from the facility as a result of this project.

TABLE 7 STANDARD NO. 7 - CLASS II PREVENTION OF SIGNIFICANT DETERIORATION FACILITY-WIDE INCREMENT EMISSION INCREASES				
AVERAGE (LONG-TERM) EMISSION INCREASE (1)				
POLLUTANT	**MSBD**	**MSBD ACTUAL EMISSIONS**	**FUTURE POTENTIAL EMISSIONS**	**EMISSION RATE INCREASE**
PM_{10}	9/28/78	0	220 LB/HR	964 TPY
SO_2	9/28/78	0	1368 LB/HR	5992 TPY
MAXIMUM (SHORT-TERM) EMISSION INCREASE (2)				
POLLUTANT	**MSBD**	**MSBD ACTUAL EMISSIONS**	**FUTURE POTENTIAL EMISSIONS**	**EMISSION RATE INCREASE**
PM_{10}	9/28/78	0	220 LB/HR	220 LB/HR
SO_2	9/28/78	0	2736 LB/HR	2736 LB/HR
1) Average emission increases of PM_{10} and SO_2 are used for long-term modeling (24-hr and annual) analyses.				
2) Maximum (or instantaneous) emission increases of SO_2 are used for short-term modeling (<24 hours) analyses.				

TABLE 8 PSD CLASS II FULL IMPACT ANALYSIS SIA and 20D PSD INCREMENT CONSUMING SOURCES		
PM_{10}	SO_2	NO_X
Wellman, Inc. - Darlington	Nucor Steel Darlington	N/A
HRS Textiles, Inc.	Wellman, Inc. – Darlington	N/A
Chesterfield Lumber	HRS Textiles, Inc.	N/A
PowerSecure, Inc.	PowerSecure, Inc.	N/A
Paperboard Industries Corp.	Paperboard Industries Corp.	N/A
Talon, Inc.	Talon, Inc.	N/A
A.C. Monk	A.C. Monk	N/A
Stone Container	Stone Container	N/A
Carter Manufacturing	Carter Manufacturing	N/A
Wellman – Florence	Wellman – Florence	N/A
Tyler Plywood Corporation	Koppers Industries	N/A
Koppers Industries	Dupont-Florence	N/A
Marsh Lumber Company	Charles Ingram Lumber Co	N/A
The ESAB Group	La-Z-Boy East	N/A
Dupont-Florence	McLeod Regional Medical Center	N/A
Charles Ingram Lumber Co	Sara Lee Hosiery	N/A
La-Z-Boy East	Asea Brown Boveri	N/A
McLeod Regional Medical Center	Vulcraft-Div. of Nucor	N/A
Sara Lee Hosiery	Maytag Florence Operations	N/A
Asea Brown Boveri	NanYa Plastics	N/A
Vulcraft-Div. of Nucor	McCall Farms	N/A
Maytag Florence Operations	Roche Carolina	N/A
Nan Ya Plastics	Florence Wastewater Treatment	N/A
McCall Farms	Francis Marion University	N/A
Roche Carolina	Carolinas Hospital System	N/A
Florence Wastewater Treatment	Honda	N/A
Francis Marion University	Duquesne Energy	N/A
Carolinas Hospital System	Southern Impressions, LLC	N/A
Honda	Gatewood Products, LLC	N/A
Duquesne Energy	Crenlo, Inc	N/A
Southern Impressions, LLC	Flav-O-Rich	N/A
Gatewood Products, LLC	International Paper - Pulp & Paper Mill	N/A
Crenlo, Inc	Georgetown Steel, Inc.	N/A
Flav-O-Rich	Santee Cooper - Winyah	N/A
International Paper - Pulp & Paper Mill	Fabric Resources Intl. Ltd.	N/A
Georgetown Steel, Inc.	Cone Mills-Raytex Finishing	N/A
International Paper - Sampit Lumber	International Paper - Marion	N/A
Santee Cooper-Grainger Station	Pilliod Furniture	N/A
PPM Cranes, Inc.	Marion Memorial Hospital	N/A
Wolverine Brass, Inc.	Blumenthal Mills, Inc.	N/A
Embers Charcoal Company	Mullins Hospital	N/A
Uniblend Spinners	AVM of South Carolina	N/A
NewSouth, Inc.	Marion Ceramics	N/A

TABLE 8 PSD CLASS II FULL IMPACT ANALYSIS SIA and 20D PSD INCREMENT CONSUMING SOURCES		
PM_{10}	SO_2	NO_X
Conway Hospital	Piggly Wiggly #54	N/A
Allied Signal Metglas Products	Russell Stover Candy	N/A
Grand Strand WW treatment plant	SO-PAK-CO, INC.	N/A
Bayshore Concrete Products	Wellman, Inc. – Marion	N/A
Horry Co. SWA	Sara Lee Hosiery	N/A
Santee Cooper Horry Co. Landfill	Heritage Sportswear	N/A
Fabric Resources Intl. Ltd.	Marion Co. Medical Center	N/A
Cone Mills-Raytex Finishing	Forest Industries International, Inc.	N/A
International Paper		N/A
Pilliod Furniture		N/A
Marion Memorial Hospital		N/A
Blumenthal Mills, Inc.		N/A
Mullins Hospital		N/A
AVM of South Carolina		N/A
Marion Ceramics		N/A
Piggly Wiggly #54		N/A
Russell Stover Candy		N/A
SO-PAK-CO, INC.		N/A
Wellman, Inc. – Marion		N/A
Sara Lee Hosiery		N/A
Heritage Sportswear		N/A
Marion Co. Medical Center		N/A
Forest Industries International, Inc.		N/A
Martek		N/A
Colonial Rubber		N/A
Williamsburg Co. Mem. Hospital		N/A
Burns Phillip Food		N/A
Don's Scrap Iron & Metal, Inc.		N/A
Firestone Building Products		N/A
Milliken-Kingstree Plant		N/A

The rates in Table 7 were combined with those from additional non-facility sources identified in Table 8 and included in the PSD Class II Full Impact Increment modeling analysis. Table 9 indicates that the maximum impact for each averaging period and each pollutant was determined to be less than the PSD increment standard for each averaging period. Highest-first-high values were used for annual averaging periods and highest-second-high for all short-term averaging periods.

Table 9 CLASS II PREVENTION OF SIGNIFICANT DETERIORATION FULL IMPACT INCREMENT ANALYSIS					
POLLUTANT	AVERAGING TIME	MODEL USED	MAXIMUM MODELED CONCENTRATION (μg/m³)	STANDARD (μg/m³)	% OF STANDARD
PM_{10}	24 Hour	AERMOD	28.0	30	93.3
	Annual	AERMOD	5.2	17	30.6
SO_2	3 Hour	AERMOD	91.8 (1)	512	17.9
	24 Hour	AERMOD	31.3 (2)	91	34.4
	Annual	AERMOD	5.5 (2)	20	27.5
The highest-first-high modeled concentrations for the 5 years of Meteorological data are listed for annual averaging periods and the highest second-high for other averaging periods.					
1) Based on 0.24 lb/MM Btu emission rate for Santee Facility.					
2) Based on 0.12 lb/MM Btu emission rate for Santee Facility.					

Total long-term (24-hr and annual) and short-term (<24 hours) modeled emission rates for the Class II PSD Increment Full Impact analysis are summarized in Table 10. Dispersion parameters of each point, volume, and area source, as well as each respective modeled emission rate included in the PSD Increment Class II Full Impact analysis, are included in the facility's application (Dated July 2006, and subsequent revisions and/or additions) and the corresponding electronic modeling files. Those tables were not re-produced for this summary due to their length.

TABLE 10 CLASS II PSD INCREMENT FULL IMPACT ANALYSIS MODELED EMISSION RATE TOTALS			
	SHORT-TERM (lb/hr) (1)	LONG-TERM (lb/hr) (2)	LONG-TERM (TPY) (2)
PM_{10}	-203.1	-203.1	-889.6
SO_2	2476	-526.1	-2304
1) Maximum emission rates were used for short-term (<24 hr) modeling for SO_2.			
2) Average emission rates were used for long-term (24-hr and annual) modeling for PM_{10} and SO_2.			

However, in response to some concerns raised about how the increment inventory was developed according to MSBDs, the facility re-modeled. They used a modified NAAQS inventory for PM_{10} and SO_2 to demonstrate compliance with the Class II PM_{10} and SO_2 increments in order to insure that all increment-consuming minor sources were included in the analyses, regardless of baseline date. By utilizing the NAAQS inventories, the modeled results are conservatively high, because they (i) include all sources regardless of their status relative to the baseline date, and (ii) exclude all increment expansions due to shutdown sources. Therefore, there is no need to develop specific inventories based on Minor Source Baseline Dates for these two counties.

For the PM_{10} analysis, the originally modeled concentrations for the full impact NAAQS analysis were compared to the increment standard for 24-hour and annual averages. Both are below the increment standards of 30 μg/m³ and 17 μg/m³, respectively (see full impact analysis above). For the SO_2 3-hr average, the originally modeled concentration for the NAAQS analysis was below the increment standard of 512 μg/m³. No further analysis was required for these pollutants and averaging times.

For the 24-hour and annual averaging periods only, as originally modeled, the SO_2 NAAQS maximum modeled impacts were not below the SO_2 Class II Increments of 91 and 20 μg/m³, respectively. It was determined that the receptors that have NAAQS impacts greater than the Class II Increments were located on the property of an inventory facility, Marsh Lumber Company, in Florence County. Three small boilers are present at this facility, and all emissions from the three boilers present at Marsh Lumber Company were modeled using stack UTM coordinates of 631,809 m East and 3,762,880 m north, which is approximately 40-60 m from the two receptors of interest. A culpability analysis determined that these sources are the cause of the high modeled impacts on that facility's property, most likely due to the low stack heights and non-vertical release nature of Boiler No. 3.

Since each of these boilers was constructed prior to the SO_2 minor source baseline dates for both Florence and Marion counties, which had affected receptors within the SIA, they are not increment-consuming sources. Therefore, these sources were excluded from the modified Increment/NAAQS inventory, and the 24-hour and annual averaging periods for SO_2 were re-run. The maximum impacts modeled using the revised Increment/NAAQS SO_2 inventory without the Marsh Lumber boilers are below the SO_2 Class II Increments. Therefore, it is not necessary to develop county specific inventories to demonstrate compliance with the increment standard.

TABLE 10 - Modified CLASS II PSD INCREMENT FULL IMPACT ANALYSIS MODELED EMISSION RATE TOTALS			
	SHORT-TERM (lb/hr) (1)	**LONG-TERM (lb/hr) (2)**	**LONG-TERM (TPY) (2)**
SO_2	N/A	18,482	80,951
1) Maximum emission rates were used for short-term (<24 hr) modeling for SO_2.			
2) Average emission rates were used for long-term (24-hr and annual).			

SECTION C - ADDITIONAL IMPACT ANALYSIS – GROWTH, SOILS & VEGETATION, AND VISIBILITY IMPAIRMENT

PSD review requires an analysis of any potential impairment to visibility, soils, and vegetation that may occur as a result of the proposed or modified facility/sources. The review also requires an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial, and other growth associated with the expansion.

C.1. GROWTH

The SC PSD rules require the applicant to provide information relating to the nature and extent of air quality impacts from all commercial, residential, industrial and other growth, which has occurred since August 7, 1977, in the area the facility, or modification, would affect. For the purposes of this report, the area the facility would affect is defined as the area of significant impact. The greatest significant impact distance was determined to be 7.0 km around the facility.

Santee Cooper completed a Growth Analysis associated with the project as required in the New Source Review Workshop Manual, Section D, Additional Impact Analysis. Although the temporary work force increase during the construction phase of the project will be substantial, PSD guidance regarding the conduct of a growth analysis does not require the consideration of temporary work force increases during the construction of the facility in the growth impact analysis.

a) The growth analysis included in the permit application does consider the long-term work force of approximately 100 workers. However, because the local nine-county area has a high unemployment rate, the existing local population is expected to provide most of the workforce, which means that little or no residential growth will result from operation of the facility. Therefore, there is anticipated to be virtually no "associated commercial and industrial growth with the new employees."

b) While the proposed facility could result in some of the permanent workforce from outside the immediate area as well as additional road and rail traffic, the area the facility would affect was defined as the area of significant impact. The greatest significant impact distance was determined to be 7.0 km around the plant. The construction and modification of the facility and any workforce growth associated residential and commercial growth is not expected to cause or contribute a quantifiable adverse impact on local ambient air quality. In addition, new fuel requirements and regulations are expected to keep impacts of the additional traffic to a minimum.

C.2. SOILS AND VEGETATION

Maximum predicted offsite impacts were compared to EPA screening levels or other available air quality standards. The annual SO_2 impact exceeds the EPA screening concentration, however, the receptors where the exceedances occur are located adjacent to the Marsh Lumber inventory source. These receptors are likely on the property of that facility. The largest annual concentration from Pee Dee sources at those receptors is 0.2 ug/m^3, which is below the significance level. Modeling of all the proposed and existing emissions for the soils and vegetation analysis indicated that the maximum concentrations for all averaging times were less than each applicable standard. Thus, there are no adverse impacts expected on soils or vegetation based on facility emissions.

a) Santee Cooper used conservative screening concentrations, as detailed in EPA guidance, [U.S. EPA, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals* (EPA 450/2-81-078), 1980] to ensure that no adverse impacts to soils and vegetation would occur as a result of the project. For pollutants with modeled concentrations that exceeded the model significance levels (MSL), the full off-site inventory of sources was included in order to provide a comprehensive analysis. Further, Santee Cooper used the screening values based on the most sensitive plants, rather than on an inventory of the surrounding vegetation, which provided a conservative approach to the screening analysis.

b) This screening concentration approach is standard in PSD modeling analyses, and has been used at numerous facilities, including several recently permitted power plant projects (e.g., Longleaf Energy). EPA Region 4 has also recently confirmed that the EPA guidance was the proper source for screening values for the Thoroughbred project in Kentucky. [*Secretary's Findings, Conclusions of Law, and Final Order for the Thoroughbred Generating Station*, Commonwealth of Kentucky Environmental and Public Protection Cabinet File No. DAQ-26003-037 and DAQ-26048-037]

Also, the proposed Pee Dee facility is not located next to any state or federally designated lands receiving special protection. Further, no other state or federal agencies have objected to the soils and vegetation analysis, and the FWS determined that the proposed project analyses were acceptable. Thus, the evaluation of the screening thresholds and comparison to the secondary NAAQS is appropriate to demonstrate the lack of adverse impacts on soils and vegetation from the Pee Dee facility.

Table 11
SOILS AND VEGETATION ANALYSIS

Pollutant	Averaging Time	Model Used	MAX. Impact (μg/m^3)	Back-ground (μg/m^3)	Facility / Regional Impact (μg/m^3) (2)	EPA Screening Concentration (μg/m^3)	AAQS Standard (μg/m^3)	Exceeds?
PM_{10}	24 Hour	AERMOD	34.6	49.0	83.6	N/A	150	No
	Annual	AERMOD	5.6	23.5	29.1	N/A	50	No
SO_2	1 Hour	AERMOD	245.4	264.4	509.8	917	N/A	No
	3 Hour	AERMOD	224.7	146.6	371.3	786	1300	No
	Annual	AERMOD	34.4	4.7	39.1	18	80	No
NO_X	4 Hour (3)	AERMOD	20.1 (1)	N/A	20.1	3760	N/A	No
	8 Hour (3)	AERMOD	17.4 (1)	N/A	17.4	3760	N/A	No
	1 Month (3)	AERMOD	2.06 (1)	N/A	2.06	564	N/A	No
	Annual	AERMOD	0.9 (1)	19.0	19.9	94	100	No
CO	1 Week (4)	AERMOD	39.8 (1)	2519	2559	1,800,000	N/A	No
Fluoride	10 Day (4)	AERMOD	0.04 (1)	N/A	0.04	0.5	--	No
Lead	Quarterly (6)	AERMOD	0.003 (1)	0.004	0.007	1.5	--	No
Sulfuric Acid Mist	24 Hour	AERMOD	0.57 (1, 3)	N/A	0.57	--	10 (5)	No

1) Concentrations include only the facility impacts since they either did not exceed the Significant Impact Levels or none were available. All other values include full impact sources.

2) Results include background values when available.

3) Averaging period concentrations were determined directly using selected periods in modeling software, and not by applying conversion factors to a 1-hour concentration. Highest first high concentrations were used for comparison. In some instances, Santee Cooper reported a more conservative value such as using the 1-hour concentration to compare to a 4-hour or 24-hour standard.

4) Non-Standard Averaging period was conservatively estimated as follows:
1 Week CO = 8 hour concentration; background value is also 8-hr value.
10 Day Fluoride = 24 hour concentration

5) Standard 8 concentration was used since there was no EPA level available.

6) Quarterly impacts are calculated using the DHEC conversion factor of 0.3 times the hourly impact.

C.3. VISIBILITY

This visibility impairment analysis is distinct from the Class I visibility impact analysis. VISCREEN was used following the guidelines published in the *Workbook for Plume Visual Impact Screening and Analysis* (EPA-450/4-88-015, 1988; Revised 1992) (hereafter referred to as the workbook). The procedure consists of a screening process done through several levels. A nearby sensitive receptor, such as a state park or local airport, is analyzed to determine if an impact is expected.

EPA has developed two guidance documents for VISCREEN modeling: a workbook and a tutorial to assist with the application of the model itself. [http://www.epa.gov/scram001/dispersion_screening.htm#viscreen] To address the one percentile worst-case meteorological conditions, these guidance documents provide two different methods that can be used to determine the worst-case meteorological conditions for use in the Level II analysis. Neither of the methods is described as "preferred" and both are considered to be valid.

Santee Cooper used the tutorial approach to calculate a worst-case meteorological condition of E stability and a 5 m/s wind speed. The Department used the workbook to determine a worst-case meteorological condition of E stability and a 3 m/s wind speed. The guidance documents provide two different approaches to analyze the data, resulting in slightly different conditions. The tutorial approach used by Santee Cooper evaluated worst-case meteorological conditions for each of the five data years (1987-1991) to determine the worst-case dispersion characteristics. The workbook procedure used by the Department analyzed the full, five-year (1987-1991) dataset to determine the one-percentile worst-case meteorological condition for persistence and frequency of occurrence. This one-percentile worst-case meteorology is indicative of the worst-day plume visual impacts when the probability of worst-case meteorological conditions is coupled with the probability of other factors being ideal for maximizing the plume visual impacts.

The only visibility sensitive area within the vicinity of the Santee Cooper Pee Dee project was the Lake City Municipal Airport located 27 km southwest of the facility. There are no other areas matching the definition of a visibility sensitive area (state and national parks, monuments, airports, etc.) that are located closer to the project location. The impacts at Lake City Municipal Airport were evaluated against the VISCREEN criteria and passed using both analysis methods. Calculations were performed for two assumed plume-viewing backgrounds: the horizon sky and a dark terrain object. Five years of meteorological data were analyzed. Descriptions of this are included in Santee Cooper's Class II Modeling Report for the tutorial method used by Santee Cooper and in the Department's preliminary modeling determination report for the workbook approach. The Table below shows the screening values from the Departments results obtained using the workbook method.

Table 12 (a)
VISIBILITY IMPAIRMENT ANALYSIS

Background	Theta	Azi	Distance (km)	Alpha	ΔE Critical	ΔE Plume	Contrast Critical	Contrast Plume
Sky	10	95	28	74	2.0	1.6	0.05	0.006
Sky	140	95	28	74	2.0	0.6	0.05	-0.015
Terrain	10	84	27	84	2.0	1.1	0.05	0.015
Terrain	140	84	27	84	2.0	0.3	0.05	0.012

Table 12 (b) VISIBILITY IMPAIRMENT ANALYSIS INPUTS		
Parameter	**Value**	**Units**
Particulate Matter	205.2	lb/hr
NOx	798	lb/hr
Primary Sulfur	57	lb/hr
Background Ozone	0.04	ppm
Plume-source-observer angle	11.25	Degrees
Background visual range	25	Km
Wind Speed	3	Meters/sec
Stability Class	E	

SECTION D – PSD CLASS I IMPACT ANALYSIS

A facility within 100 km of a Class I area must perform Class I modeling to determine the impact on the Class I area. For the visibility and deposition analyses, the recommendations in the; 1) *Interagency Workgroup on Air Quality Modeling Phase II Summary Report and Recommendations for Modeling Long Range Transport Impacts (IWAQM)* (EPA-454/R-98-019, December 1998); 2) *Federal Land Managers' Air Quality Related Values Workgroup Phase I Report (FLAG)* (U.S. Forest Service- Air Quality Program, the National Park Service – Air Resources Division, and the U.S. Fish & Wildlife Service – Air Quality Branch, December 2000); 3) *Regional Haze Regulations and Guidelines for Best Available Retrofit Technology* (U.S. EPA, June 15, 2005); and 4) U.S. EPA's *Guidelines on Air Quality Models (Guideline)*, were followed.

Dispersion modeling was performed to evaluate the potential impacts to the Cape Romain National Wildlife Refuge, located approximately 100 km to the south of the proposed Kingsburg facility. Given the complex nature of the meteorology in a shoreline environment and the recommendations of the various regulatory agencies, the CALPUFF model was used for performing all of the air dispersion modeling for this project. Modified MM5 (mesoscale meteorological forecast model) data was used in CALMET (version 5.53a) to provide input into CALPUFF (version 5.711a). CALPOST (version 5.51) was used as the postprocessor to generate the ambient concentrations of PM_{10}, SO_2, and NO_X at the Class I areas for comparison to; 1) the PSD Class I increment modeling significance level; 2) the total deposition of sulfur and nitrogen for assessment against the deposition assessment threshold values for sulfate and nitrate set by the FLM (DAT); and 3) the 24-hour average visibility impairment.

CALPUFF modeling was not performed by SCDHEC for this project, but was accepted by South Carolina upon approval of the Federal Land Manager. A summary of Class I impact results, as provided in the July 2006 and April 2007 submittals, is provided below.

All modeling was performed using a refined grid modeling approach in the CALPUFF modeling system. Based on this dispersion, deposition, and visibility modeling, the ambient air impacts of the project were estimated to be less than all threshold levels specified by all applicable regulatory requirements except for the short-term SO_2 impacts on the Cape Romain NWR. Air impacts of increased SO_2 emissions were greater than the applicable SILs for the 3-hr and 24-hr averaging periods, which required an additional cumulative impact analysis to be performed. Other sources of SO_2 emissions within the modeling domain, which consume PSD increment (or expand the increment if no longer in service), were obtained from DHEC. Cumulative air quality modeling for the Cape Romain Class I receptors was performed for these sources combined with the facility sources. The cumulative PSD increment impacts were less than the Class I area allowable PSD increments.

D.1. CLASS I SIGNIFICANT IMPACT LEVEL ANALYSIS

Table 13 shows the maximum impacts on Cape Romain for SO_2, NO_x, and PM_{10}. The air quality impacts are less than the Class I SILs for PM_{10}, NO_x, and the SO_2 annual averaging period. The impacts of the facility emissions are greater than the applicable Class I SIL for SO_2, for the 3-hour and 24-hour averaging periods. Therefore, for the SO_2 3-hour and 24-hour averaging periods, a cumulative impact analysis is required. No further air concentration analyses are required to demonstrate compliance with the PSD increments for PM_{10}, NO_x, and the SO_2 annual averaging period.

Table 13 CLASS I PSD SIGNIFICANT IMPACT LEVEL ANALYSIS					
Pollutant	**Averaging Time**	**Model Used**	**Maximum Modeled Concentration (μg/m^3)**	**SIL (μg/m^3)**	**Significant Impact?**
PM_{10}	24 HOUR	CALPUFF	0.076	0.32	No
	ANNUAL	CALPUFF	0.003	0.16	No
SO_2	3 HOUR	CALPUFF	2.498	1.0	Yes
	24 HOUR	CALPUFF	0.819	0.2	Yes
	ANNUAL	CALPUFF	0.027	0.1	No
NO_X	ANNUAL	CALPUFF	0.009	0.1	No
Highest First-high values is shown for all pollutants and averaging periods.					

D.2. CLASS I INCREMENT CONSUMPTION IMPACT ANALYSIS
PSD increment consuming and increment expanding sources for SO_2 in the modeling domain were considered in this analysis. The modeling domain was determined by; 1) developing a list of all sources within 100 km of the facility; 2) including all increment sources less than 100 km from Cape Romain; 3) for sources between 100 and 200 km from Cape Romain, including sources if the facility total increment potential emissions were greater than 100 TPY of any PSD pollutant; and 4) for sources greater than 200 km from Cape Romain, including sources if the facility total increment potential emissions were greater than 250 TPY of any PSD pollutant.

Additional CALPUFF modeling for these increment-affecting sources was performed over the whole modeling domain for impacts on the Cape Romain NWR. The results of these cumulative effects are shown in Table 14. As shown, these impacts do not exceed the allowable PSD increments for a Class I area.

TABLE 14 CLASS I PSD INCREMENT IMPACTS CAPE ROMAIN NATIONAL WILDLIFE REFUGE					
Pollutant	**Averaging Time**	**Model Used**	**Maximum Modeled Concentration (μg/m^3)**	**Standard (μg/m^3)**	**% of Standard?**
SO_2	3 HOUR	CALPUFF	16.1	25	64
	24 HOUR	CALPUFF	4.7	5	94
	ANNUAL	CALPUFF	0.5	2	25
Highest First-high values is shown for all averaging periods.					
Standards are from SC Regulation 61-62.5 Standard 7, Class I Area limits.					

D.3. CLASS I VISIBILITY ANALYSIS
The visibility analysis evaluates the potential change in light extinction relative to the natural background as a result of the proposed project. Visibility is described through two methods, Plume Impairment and Regional Haze. Regional haze occurs at distances where the plume has become evenly dispersed into the atmosphere such that there is no definable plume. The revised EPA guidance (IWAQM, 1998) and the FLM guidance (FLAG, 2000) recommends the use of non-steady state dispersion modeling for both screening and refined dispersion modeling.

Plume impairment was not evaluated for this project since the distance from the facility to the Cape Romain NWR was greater than 50 km. Only regional haze was evaluated.

The peak 24-hour visibility impairment as predicted by the air quality model is typically used to attribute visibility affects to a single source. However, the recently promulgated Regional Haze Regulations and *Guidelines for Best Available Retrofit Technology* establish a different method for assessing whether a single facility causes or contributes to visibility impairment. This guidance establishes a 0.5 deciview (dv) (roughly equivalent to 5% extinction change) threshold for contribution and 1.0 dv (approximately 10% extinction change) threshold for causation of visibility impairment. These thresholds are essentially equivalent to the FLAG guidance, except that they are to be applied to the 98th percentile model result for an analysis that considers multiple years of met data. Visibility modeling results are presented at both peak and 98th percentile levels to demonstrate two interpretations of the model results. This analysis utilizes the Visibility Improvement State and Tribal Association of the Southeast (VISTAS) version of the CALPOST processor to assess impacts from the proposed project on regional haze.

The IWAQM recommended "Method 2", which uses hourly relative humidity adjustment applied to background and modeled sulfate and nitrate with the relative humidity factor capped at 95%, was used to compute visibility impairment in terms of Δb_{ext} from modeled pollutant concentrations. This post-processing option uses observed relative humidity values and pollutant concentrations at each receptor to compute the percent change in visibility due to the facility's emissions compared against the natural background visibility under the prevailing atmospheric conditions. Method 2 is considered the default approach under FLAG and the results are shown in Table 15. The New IMPROVE equation incorporates many natural background scattering processes in an attempt to isolate true source contribution.

TABLE 15
CLASS I AREA VISIBILITY IMPAIRMENT ANALYSIS AT CAPE ROMAIN NATIONAL WILDLIFE REFUGE USING METHOD 2

Year	Method 2			
	Maximum Impact	98th Percentile	Number Days >5%	Number Days >10%
2001	10.97%	5.24%	8	2
2002	9.31%	5.33%	10	0
2003	28.37%	4.68%	5	1
	Method 2 with IMPROVE tool			
2001	7.78%	3.98%	5	0
2002	7.00%	4.07%	2	0
2003	21.37%	3.51%	3	1

The "Method 6" approach, computes Δb_{ext} using a monthly average relative humidity adjustment particular to each Class I area applied to background and modeled sulfate and nitrate. Because a monthly average is used, no cap on f(RH) is necessary since the function is not used in Method 6. The results tend to be smoothed out since peak short-term humidity events are not considered. Method 6 is not typically considered a default approach for PSD AQRV analyses, but is used to assess visibility impairment under the U.S. EPA's G*uidance for Best Achievable Retrofit Technology*, in particular in the VISTAS regional planning organization. When using this methodology, the light extinction change above background extinction that is compared to the 5% threshold is set at the 98th percentile value from the modeling. This translates into the 8th highest visibility impact or light extinction change above background in a given year being compared to the 5% threshold change.

Table 16 provides the visibility impacts for each year of meteorological data and shows the 8th highest value for each year of analysis.

TABLE 16 CLASS I AREA VISIBILITY IMPAIRMENT ANALYSIS AT CAPE ROMAIN NATIONAL WILDLIFE REFUGE USING METHOD 6			
Method 6			
Maximum Impact	**98th Percentile**	**Number Days >5%**	**Number Days >10%**
13.85%	4.07%	5	1
Method 6 with IMPROVE tool			
10.18%	2.98%	4	1

As shown, the facility does show exceedances of the 5% threshold on the highest impact day. However, as evidenced by the 98th percentile values (8th highest day), these high days occur very infrequently. Therefore, taking into account the intensity, duration, frequency, and time of visibility impairment, the impacts from the facility do not create an adverse impact on visibility.

D.4. CLASS I DEPOSITION ANALYSIS

For the sulfate/nitrate deposition analysis, modeling was performed for the Class I area following the refined CALPUFF methodology outlined above. Table 17 presents the annual deposition values compared to the Deposition Analysis Threshold (DAT) for sulfur and nitrogen deposition of 0.01 kg/ha/yr. These DAT values are a guideline established by the FLM, not a regulatory standard. The estimated nitrate deposition was less than the applicable DAT and the sulfate deposition was slightly higher than the East U.S. DAT. Considering that coastal ecosystems have evolved under naturally higher sulfur deposition rates, an adverse impact on the Cape Romain NWR is not expected.

TABLE 17 SULFATE/NITRATE DEPOSITION AT CAPE ROMAIN NATIONAL WILDLIFE REFUGE – SIL EMISSIONS					
Deposition Rate (kg/ha/yr)					
Sulfur	**DAT**	**Exceeds**	**Nitrogen**	**DAT**	**Exceeds**
0.021	0.01	Yes	0.004	0.01	No

SECTION E – SOUTH CAROLINA FACILITY-WIDE COMPLIANCE DEMONSTRATION

All minor and major sources proposing new construction or construction modifications in South Carolina are required to demonstrate compliance with South Carolina Regulation No. 62.5 Standards Nos. 2 (AAQS), 7 (Class II PSD Increment), and 8 (Air Toxics). Standard No. 7 (PSD) Part k - "Source Impact Analysis" and Part p - "Sources Impacting Federal Class I Areas - Additional Requirements" require Class II modeling. Facility-wide emissions from the Santee Cooper Pee Dee facility only were modeled to demonstrate compliance with Standards 2 and 7. Dispersion parameters and emission rates included in this portion of the compliance demonstration are listed in the Tables in Section F of the summary.

Table 18
STANDARD NO. 2 - AAQS MODELING ANALYSIS

Pollutant	Averaging Time	Model Used	Maximum Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total ($\mu g/m^3$)	Standard ($\mu g/m^3$)	% of Standard
TSP	Annual	AERMOD	10.1	22.4	32.5	75	43.3
PM_{10}	24 Hour	AERMOD	27.9 (2)	49	76.9	150	52.5
	Annual	AERMOD	5.2	23.5	28.7	50	57.4
SO_2	3 Hour	AERMOD	75.1	146.6	221.7	1300	17.1
	24 Hour	AERMOD	13.8	34.0	47.8	365	13.1
	Annual	AERMOD	1.6	4.7	6.3	80	7.9
NO_2	Annual	AERMOD	0.9	19.0	19.9	100	19.9
CO	1 Hour	AERMOD	70.5	2863	2934	40,000	7.3
	8 Hour	AERMOD	39.8	2519	2559	10,000	25.6
Lead	Quarterly	AERMOD	0.003 (3)	0.004	0.007	1.5	0.5
Gaseous Flourides	12 Hour	AERMOD	0.06	(4)	0.06	3.7	1.6
	24 Hour	AERMOD	0.04	(4)	0.04	2.9	1.4
	Weekly	AERMOD	0.04	(4)	0.04	1.6	2.5
	Monthly	AERMOD	0.01	(4)	0.01	0.8	1.2

1) Highest first-high modeled concentration was used for all averaging times, unless otherwise noted.

2) Highest second-high modeled concentration.

3) Quarterly impacts are calculated using the DHEC conversion factor of 0.3 times the hourly impact.

4) There is no background value for HF.

5) The 24-hour average concentration was used to compare to the weekly standard. This is a conservative approach.

Table 19 BACKGROUND MONITORING DATA (μg/m^3)									
Pollutant	**Site Name**	**County**	**Year**	**1-Hr**	**3-Hr**	**8-Hr**	**24-Hr**	**Qtr**	**Annual**
TSP	Sneed Middle School	Florence	2005						22.4
PM_{10}	Winyah	Georgetown	2005				49		23.5
SO_2	Georgetown CMS	Georgetown	2005	264.4	146.6		34.0		4.7
NO_2	Jenkins Ave Fire Station	Charleston	2005						19.0
CO	State Hospital	Richland	2005	2863		2519			
Pb	Sneed Middle School	Florence	2005					0.004	
Mean was used for Annual Averaging Time and 2nd high was used for all other averaging periods. Pb is the highest of the four quarters.									

Table 20 STANDARD NO. 7 - CLASS II PSD MODELING ANALYSIS					
POLLUTANT	**AVERAGING TIME**	**MODEL USED**	**MAXIMUM MODELED CONCENTRATION (μg/m^3) (1)**	**STANDARD (μg/m^3)**	**% OF STANDARD**
PM_{10}	24 Hour	AERMOD	27.9 (2)	30	99.3
	Annual	AERMOD	5.2	17	30.6
SO_2	3 Hour	AERMOD	75.1	512	14.7
	24 Hour	AERMOD	13.8	91	15.2
	Annual	AERMOD	1.6	20	8.0
NO_2	Annual	AERMOD	0.9	25	3.6
1) Highest first-high modeled concentration was used for all averaging times, unless otherwise noted.					
2) Highest second-high modeled concentration.					

SECTION F – MODELED SOURCE EMISSION RATES & STACK PARAMETERS

STANDARD NO. 2 - MODELED EMISSION RATES (LBS/HR)					
SOURCE IDENTIFICATION	**TSP**	**PM_{10}**	**SO_2 (1)**	**NO_X**	**CO**
POINT SOURCES					
B01	102.38	102.38	684.00	399.00	912.00
B02	102.38	102.38	684.00	399.00	912.00
CR01	0.585	0.225	--	--	--
CR02	0.049	0.019	--	--	--
CT01A	0.389	0.389	--	--	--
CT01B	0.389	0.389	--	--	--
CT01C	0.389	0.389	--	--	--
CT01D	0.389	0.389	--	--	--
CT01E	0.389	0.389	--	--	--
CT01F	0.389	0.389	--	--	--
CT01G	0.389	0.389	--	--	--
CT01H	0.389	0.389	--	--	--
CT01I	0.389	0.389	--	--	--
CT01J	0.389	0.389	--	--	--
CT01K	0.389	0.389	--	--	--
CT01L	0.389	0.389	--	--	--
CT02A	0.389	0.389	--	--	--
CT02B	0.389	0.389	--	--	--
CT02C	0.389	0.389	--	--	--
CT02D	0.389	0.389	--	--	--
CT02E	0.389	0.389	--	--	--
CT02F	0.389	0.389	--	--	--
CT02G	0.389	0.389	--	--	--
CT02H	0.389	0.389	--	--	--
CT02I	0.389	0.389	--	--	--
CT02J	0.389	0.389	--	--	--
CT02K	0.389	0.389	--	--	--
CT02L	0.389	0.389	--	--	--
MT01	0.017	0.008	--	--	--
MT02	0.017	0.008	--	--	--
MT04	0.017	0.008	--	--	--
MT05	0.017	0.008	--	--	--
MT10	0.017	0.008	--	--	--
MT11	0.017	0.008	--	--	--

STANDARD NO. 2 - MODELED EMISSION RATES (LBS/HR)					
SOURCE IDENTIFICATION	**TSP**	**PM_{10}**	**SO_2 [1]**	**NO_X**	**CO**
MT15	0.017	0.008	--	--	--
MT16	0.011	0.005	--	--	--
MT17	0.011	0.005	--	--	--
MT18	0.011	0.005	--	--	--
MT19	0.011	0.005	--	--	--
MT23	0.001	0.001	--	--	--
MT24	0.001	0.001	--	--	--
MT25	0.001	0.001	--	--	--
MT28	0.001	0.001	--	--	--
MT29	0.001	0.001	--	--	--
MT30	0.001	0.001	--	--	--
MT33	0.001	0.001	--	--	--
S01	0.017	0.008	--	--	--
S02	0.017	0.008	--	--	--
S03	0.017	0.008	--	--	--
S04	0.017	0.008	--	--	--
S05	0.017	0.008	--	--	--
S06	0.017	0.008	--	--	--
S07	0.017	0.008	--	--	--
S08	0.017	0.008	--	--	--
S09	0.017	0.008	--	--	--
S10	0.017	0.008	--	--	--
S11	0.017	0.008	--	--	--
S12	0.017	0.008	--	--	--
POINT SOURCE TOTALS	**215.104**	**214.519**	**1368**	**798**	**1891**
VOLUME SOURCES					
MT03	1.738	0.817	--	--	--
MT08	1.738	0.817	--	--	--
MT09	1.738	0.817	--	--	--
MT14	1.738	0.817	--	--	--
MT20	0.132	0.062	--	--	--
MT21	0.132	0.062	--	--	--
MT22	0.132	0.062	--	--	--
MT26	0.132	0.062	--	--	--
MT27	0.132	0.062	--	--	--
MT34	0.254	0.120	--	--	--

STANDARD NO. 2 - MODELED EMISSION RATES (LBS/HR)					
SOURCE IDENTIFICATION	TSP	PM_{10}	SO_2 (1)	NO_X	CO
MT35	0.254	0.120	--	--	--
MT36	0.254	0.120	--	--	--
SP01	0.178	0.106	--	--	--
SP02	0.272	0.163	--	--	--
SP03	1.056	0.632	--	--	--
SP04	0.758	0.455	--	--	--
SP05	0.272	0.163	--	--	--
VOLUME SOURCE TOTALS	**10.91**	**5.457**	**--**	**--**	**--**
FACILITY TOTALS	**226.0**	**220.0**	**1368**	**798**	**1824**
1) SO2-3hr concentrations were modeled based on an emission rate double that of the other periods. B01 = 1368 lb/hr and B02 = 1368 lb/hr, for a facility total of 2736 lb/hr. This was in response to an EPA comment concerning a possible 3-hr emission limit.					

STANDARD NO. 2 - MODELED EMISSION RATES (LBS/HR)		
SOURCE IDENTIFICATION	HF	LEAD
B01	1.94	0.11
B02	1.94	0.11
Facility Totals	3.88	0.22

STANDARD NO. 7 - MODELED PSD CLASS II INCREMENT EMISSION RATES (LBS/HR)			
STACK ID	Minor Source Baseline Date(s)		
	9/28/78	9/28/78	N/A
	PM_{10}	SO_2 (2)	NO_X (1)
POINT SOURCES			
B01	102.38	684.00	399.00
B02	102.38	684.00	399.00
CR01	0.225	--	--
CR02	0.019	--	--
CT01A	0.389	--	--
CT01B	0.389	--	--
CT01C	0.389	--	--
CT01D	0.389	--	--
CT01E	0.389	--	--
CT01F	0.389	--	--
CT01G	0.389	--	--
CT01H	0.389	--	--
CT01I	0.389	--	--

STANDARD NO. 7 - MODELED PSD CLASS II INCREMENT EMISSION RATES (LBS/HR)			
STACK ID	Minor Source Baseline Date(s)		
	9/28/78	9/28/78	N/A
	PM_{10}	SO_2 (2)	NO_X (1)
CT01J	0.389	--	--
CT01K	0.389	--	--
CT01L	0.389	--	--
CT02A	0.389	--	--
CT02B	0.389	--	--
CT02C	0.389	--	--
CT02D	0.389	--	--
CT02E	0.389	--	--
CT02F	0.389	--	--
CT02G	0.389	--	--
CT02H	0.389	--	--
CT02I	0.389	--	--
CT02J	0.389	--	--
CT02K	0.389	--	--
CT02L	0.389	--	--
MT01	0.008	--	--
MT02	0.008	--	--
MT04	0.008	--	--
MT05	0.008	--	--
MT10	0.008	--	--
MT11	0.008	--	--
MT15	0.008	--	--
MT16	0.005	--	--
MT17	0.005	--	--
MT18	0.005	--	--
MT19	0.005	--	--
MT23	0.001	--	--
MT24	0.001	--	--
MT25	0.001	--	--
MT28	0.001	--	--
MT29	0.001	--	--
MT30	0.001	--	--
MT33	0.001	--	--
S01	0.008	--	--

STANDARD NO. 7 - MODELED PSD CLASS II INCREMENT EMISSION RATES (LBS/HR)			
STACK ID	**Minor Source Baseline Date(s)**		
	9/28/78	**9/28/78**	**N/A**
	PM_{10}	**SO_2 (2)**	**NO_X (1)**
S02	0.008	--	--
S03	0.008	--	--
S04	0.008	--	--
S05	0.008	--	--
S06	0.008	--	--
S07	0.008	--	--
S08	0.008	--	--
S09	0.008	--	--
S10	0.008	--	--
S11	0.008	--	--
S12	0.008	--	--
POINT SOURCE TOTALS	**214.5**	**1368**	**798**
VOLUME SOURCES			
MT03	0.817	--	--
MT08	0.817	--	--
MT09	0.817	--	--
MT14	0.817	--	--
MT20	0.062	--	--
MT21	0.062	--	--
MT22	0.062	--	--
MT26	0.062	--	--
MT27	0.062	--	--
MT34	0.120	--	--
MT35	0.120	--	--
MT36	0.120	--	--
SP01	0.106	--	--
SP02	0.163	--	--
SP03	0.632	--	--
SP04	0.455	--	--
SP05	0.163	--	--
VOLUME SOURCE TOTALS	**5.457**	**--**	**--**
FACILITY TOTALS	**220.0**	**1368**	**798**
1) There is no MSBD for NO_X in Florence county at this time. This project sets the MSBD.			

STANDARD NO. 7 - MODELED PSD CLASS II INCREMENT EMISSION RATES (LBS/HR)			
STACK ID	**Minor Source Baseline Date(s)**		
	9/28/78	**9/28/78**	**N/A**
	PM_{10}	**SO_2 (2)**	**NO_X (1)**
2) SO2-3hr concentrations are based on an emission rate double that of the other periods. B01 = 1368 lb/hr and B02 = 1368 lb/hr, for a facility total of 2736lb/hr. This was in response to an EPA comment concerning a possible 3-hr emission limit.			

STACK ID DESCRIPTIVE INFORMATION				
STACK ID	**SOURCE DESCRIPTION**	**DATE INSTALLED (MODIFIED)**	**STATUS**	
	Emergency Generator No. 1	TBD	Exempted	
	Emergency Generator No. 2	TBD	Exempted	
	Fire Pump	TBD	Exempted	
B01	Boiler No. 1 – 5700 MMBtu/hr Coal fired	TBD		
B02	Boiler No. 2 – 5700 MMBtu/hr Coal fired	TBD		
CR01	Coal – Petcoke Crusher	TBD		
CR02	Limestone Crusher	TBD		
CT01A-L & CT02A-L	Cooling Towers	TBD		
MT01	Railcar Unloading	TBD		
MT02	Conveyor Transfer to Stacker/Reclaim	TBD		
MT03	Emergency Stockout drop to Pile	TBD		
MT04	Transfer Tower Conveyor	TBD		
MT05	Emergency Reclaim	TBD		
MT08	Stacker/Reclaimer Stockout	TBD		
MT09	Stacker/Reclaimer Reclaim	TBD		
MT10	Conveyor to Crusher Tower	TBD		
MT11	Conveyor to Transfer Tower	TBD		
MT14	Hopper Loading	TBD		
MT15	Conveyor Transfer	TBD		
MT16	Fly Ash - Truck loadout 1	TBD		
MT17	Fly Ash – Truck loadout 2	TBD		
MT18	Fly Ash - Silo 1	TBD		
MT19	Fly Ash - Silo 2	TBD		
MT20	Truck Unloading To Limestone Pile	TBD		
MT21	Limestone reclaim feeder	TBD		
MT22	Limestone emergency reclaim feeder	TBD		

STACK ID DESCRIPTIVE INFORMATION				
STACK ID	**SOURCE DESCRIPTION**	**DATE INSTALLED (MODIFIED)**	**STATUS**	
MT23	Limestone drop to crusher house	TBD		
MT24	Limestone emergency drop to crusher house	TBD		
MT25	Limestone crusher drop to overland conveyors	TBD		
MT26	Limestone overland conveyor drop to cross conveyor	TBD		
MT27	Limestone emergency overland conveyor drop to cross conveyor	TBD		
MT28	Limestone cross conveyor drop to Limestone Silo #1	TBD		
MT29	Limestone overland conveyor drop to Limestone Silo #2	TBD		
MT30	Limestone overland conveyor drop to Limestone Silo #3	TBD		
MT33	Lime Silo	TBD		
MT34	Gypsum Conveyor to Stockout	TBD		
MT36	Gypsum Truck loading	TBD		
MT35	Gypsum conveyor to Off-Spec Stockout	TBD		
S01 – S12	Coal Silos 1 thru 12	TBD		
SP01	Limestone Storage Pile	TBD		
SP02	Gypsum Storage Pile	TBD		
SP03	Coal Storage Pile	TBD		
SP04	Petcoke Storage Pile	TBD		
SP05	Off-Spec Gypsum Storage Pile	TBD		

AERMOD SPECIFICATIONS TABLE 1								
MET DATA	KCAE87 – KCAE91 -- 1987-1991 met data for surface air from Columbia, SC station #13883 Upper air from Athens, GA station #13873							
PROJECTION DATUM	NAD27	X	NAD83		WGS-84		NWS-84	
RURAL or URBAN ?	Rural	X	Urban					
ELEVATIONS EXTRACTED	Buildings	Yes	Sources	Yes	Tanks	No	Receptors	Yes

DEM Quads	PMI	SO_2I	SO_2I3	PMN	SO_2N	SO_2N3	NO_XS	PMS	SO_2S	SO_2S3	Other S
7.5 Minute DEM Quads											
Brittons Neck										X	
Centenary										X	
Evergreen, SC										X	
Friendship							X	X	X	X	X
Gresham							X	X	X	X	X
Johnsonville							X	X	X	X	X
Lake City East										X	
Pamplico North							X	X	X	X	X
Pamplico South							X	X	X	X	X
Prospect Crossroads							X	X	X	X	X
Scranton										X	
Snow Island										X	
1 Degree DEM Quads											
Augusta-East	X	X	X	X	X	X					
Florence-East	X	X	X	X	X	X					
Florence-West	X	X	X	X	X	X					
Georgetown-East	X	X	X	X	X	X					
Georgetown-West	X	X	X	X	X	X					
Spartanburg-East	X	X	X	X	X	X					

PMI = PM Full Impact Increment	NO_XS = Significance run for NO_X, and Standards 2 and 7
SO_2I = SO_2 Full Impact Increment 24-hr and annual averaging periods	PMS = Significance runs for PM & TSP, and Standards 2 and 7
SO_2I3 = SO_2 Full Impact Increment 3-hr averaging period	SO_2S = Significance runs for SO_2 24-hr & annual periods, and Standards 2 and 7
PMN = NAAQS Full Impact for PM	SO_2S3 = Significance run for SO_2 3-hr period, and Standards 2 and 7
SO_2N = NAAQS Full Impact for SO_2 24-hr and annual averaging periods	Other = Significance runs for CO, HF, PB, H_2SO_4, and Standard 2
SO_2N3 = NAAQS Full Impact for SO_2 3-hr averaging period	

MODELED POINT SOURCE PARAMETERS													
STACK ID	DATE LAST MODELED	LOCATION (UTM)		STACK HEIGHT (FT)	EXIT TEMP. (°F)	EXIT VELOCITY (FT/SEC)	STACK DIAMETER (FT)	DISCHARGE ORIENTATION	RAIN CAP?	BUILDING PARAMETERS			DIST TO PROPERTY LINE (FT)
		EAST (M)	NORTH (M)							HEIGHT (FT)	WIDTH (FT)	LENGTH (FT)	
B01	2007	639253	3754781	650	122	60	25.0	Vertical	No				
B02	2007	639253	3754781	650	122	60	25.0	Vertical	No				
CR01	2007	639229	3754885	85	68	10.31	5.0	Vertical	No				
CR02	2007	639358	3754904	35	68	10.31	5.0	Vertical	No				
CT01A	2007	638816	3754800	146	68	24.4	3.0	Vertical	No				
CT01B	2007	638816	3754779	146	68	24.4	3.0	Vertical	No				
CT01C	2007	638837	3754819	146	68	24.4	3.0	Vertical	No				
CT01D	2007	638837	3754800	146	68	24.4	3.0	Vertical	No				
CT01E	2007	638836	3754779	146	68	24.4	3.0	Vertical	No				
CT01F	2007	638835	3754759	146	68	24.4	3.0	Vertical	No				
CT01G	2007	638855	3754819	146	68	24.4	3.0	Vertical	No				
CT01H	2007	638855	3754798	146	68	24.4	3.0	Vertical	No				
CT01I	2007	638854	3754778	146	68	24.4	3.0	Vertical	No				
CT01J	2007	638854	3754757	146	68	24.4	3.0	Vertical	No				
CT01K	2007	638874	3754798	146	68	24.4	3.0	Vertical	No				
CT01L	2007	638874	3754778	146	68	24.4	3.0	Vertical	No				
CT02A	2007	639132	3754219	146	68	24.4	3.0	Vertical	No				
CT02B	2007	639130	3754202	146	68	24.4	3.0	Vertical	No				
CT02C	2007	639151	3754239	146	68	24.4	3.0	Vertical	No				
CT02D	2007	639151	3754219	146	68	24.4	3.0	Vertical	No				
CT02E	2007	639151	3754201	146	68	24.4	3.0	Vertical	No				
CT02F	2007	639150	3754181	146	68	24.4	3.0	Vertical	No				
CT02G	2007	639172	3754239	146	68	24.4	3.0	Vertical	No				
CT02H	2007	639171	3754219	146	68	24.4	3.0	Vertical	No				

CT02I	2007	639171	3754201	146	68	24.4	3.0	Vertical	No				
CT02J	2007	639170	3754180	146	68	24.4	3.0	Vertical	No				
CT02K	2007	639191	3754218	146	68	24.4	3.0	Vertical	No				
CT02L	2007	639191	3754200	146	68	24.4	3.0	Vertical	No				
MT01	2007	639657	3755273	15.00	68	0.03	2.00						
MT02	2007	639417	3755045	35.00	68	0.03	2.00						
MT04	2007	639541	3755182	85.00	68	0.03	2.00						
MT05	2007	639344	3754956	35.00	68	0.03	2.00						
MT10	2007	639124	3754786	85.00	68	0.03	2.00						
MT11	2007	639577	3755212	85.00	68	0.03	2.00						
MT15	2007	639307	3755021	10.00	68	0.03	2.00						
MT16	2007	639134	3754884	10.00	68	0.03	4.00						
MT17	2007	639151	3754900	10.00	68	0.03	4.00						
MT18	2007	639135	3754923	85.00	68	0.03	4.00						
MT19	2007	639118	3754907	85.00	68	0.03	4.00						
MT23	2007	639360	3754905	35.00	68	0.03	2.00						
MT24	2007	639357	3754903	35.00	68	0.03	2.00						
MT25	2007	639352	3754897	35.00	68	0.03	2.00						
MT28	2007	639287	3754835	85.00	68	0.03	2.00						
MT29	2007	639282	3754841	85.00	68	0.03	2.00						
MT30	2007	639269	3754821	85.00	68	0.03	2.00						
MT33	2007	639127	3754916	65.00	68	0.03	4.00						
S01	2007	639033	3754664	175	68	2.86	10.0	Vertical	No				
S02	2007	639040	3754656	175	68	2.86	10.0	Vertical	No				
S03	2007	639046	3754650	175	68	2.86	10.0	Vertical	No				
S04	2007	639052	3754643	175	68	2.86	10.0	Vertical	No				
S05	2007	639058	3754636	175	68	2.86	10.0	Vertical	No				
S06	2007	639064	3754629	175	68	2.86	10.0	Vertical	No				

S07	2007	639092	3754602	175	68	2.86	10.0	Vertical	No				
S08	2007	639098	3754595	175	68	2.86	10.0	Vertical	No				
S09	2007	639104	3754588	175	68	2.86	10.0	Vertical	No				
S10	2007	639112	3754582	175	68	2.86	10.0	Vertical	No				
S11	2007	639117	3754575	175	68	2.86	10.0	Vertical	No				
S12	2007	639124	3754568	175	68	2.86	10.0	Vertical	No				

MODELED VOLUME SOURCE PARAMETERS							
STACK ID	DATE LAST MODELED	LOCATION (UTM)		SOURCE RELEASE HEIGHT (FT)	VERTICAL DIMENSION σ_Z (FT)	HORIZONTAL DIMENSION σ_Y (FT)	DIST TO PROPERTY LINE (FT)
		EAST (M)	NORTH (M)				
MT03	2007	639570	3755143	30	7.0	0.9	
MT08	2007	639458	3755112	30	7.0	0.9	
MT09	2007	639455	3755111	30	7.0	0.9	
MT14	2007	639335	3755051	5	1.1	0.9	
MT20	2007	639495	3754765	5	1.15	0.9	
MT21	2007	639387	3754897	30	7.0	0.9	
MT22	2007	639364	3754876	30	7.0	0.9	
MT26	2007	639290	3754835	30	7.0	0.9	
MT27	2007	639288	3754837	30	7.0	0.9	
MT34	2007	639136	3754986	30	7.0	0.9	
MT35	2007	639120	3754970	30	7.0	0.9	
MT36	2007	639151	3754987	5	1.15	0.92	
SP01	2007	639438	3754824	30	7.0	119.85	
SP02	2007	639092	3755019	30	7.0	28.94	
SP03	2007	639531	3754998	30	7.0	229.79	
SP04	2007	639375	3755164	30	7.0	187.47	
SP05	2007	639067	3754995	30	7.0	28.94	

MODELING EXEMPTIONS/DEFERRALS	
SOURCE IDENTIFICATION	**EXEMPTION/DEFERRAL BASIS**
Emergency generators 1 & 2 & Fire pump	Standards 2, 7 and 8 - Emergency power generator less than 150 KW or that runs less than 500 hours per year.
B01, B02	Standard 8 - Fuel burning source which burns only virgin fuel or specification used oil.

MODELING HISTORY			
DATE	**MODELED BY**	**REASON MODELED**	**DESCRIPTION**
12/11/2008	TOP	PSD C/P Revised	PSD construction application for Greenfield facility. Modeled preliminary and full impact analysis for NAAQS and PSD Increment, and State Standards 2, 7, and 8. Class I summary included for reference.

AIR DISPERSION MODELING SUMMARY SHEET

Of Voluntary Additional Modeling for the Santee Cooper Pee Dee Facility
Permit Number 1040-0113
December 12, 2008

This summary is an addition to the Department's standard modeling summary. It was created to include modeling not required by state regulations, but modeling that was done to provide additional information in response to comments on the Santee Cooper Pee Dee permit application.

Mercury and Sulfuric Acid Modeling

The EPA has not set national ambient air quality standards for HAP emissions. Therefore, there are no national ambient standards for mercury or sulfuric acid to use in accessing the impacts of these HAP emissions of the Pee Dee plant. South Carolina, however, has established maximum allowable ambient concentrations (MAAC) for air toxics emissions under S. C. Regulation 61-62.5, Standard No. 8 - Toxic Air Pollutants (Standard No. 8).

Under the Standard No. 8 exemption for sources that burn virgin fuels, the facility was not required to model for mercury or for sulfuric acid. However, due to concerns over HAP emissions impacts, Santee Cooper voluntarily submitted mercury and sulfuric acid air dispersion modeling. The modeling was reviewed by the Department and the results were compared to the applicable MAAC standards as shown in the tables below.

Mercury emissions were calculated from 40 CFR 60 Subpart Da emission limits. The boilers will fire predominantly bituminous coal and therefore will be limited to mercury emissions of 2.00E-05 pounds per megawatt-hour (lb/MWh). Each boiler will generate 660 MW gross and as such, the emission limit per unit will be 0.0132 pounds per hour (lb/hr) or 116 lb/yr. Note that the draft permit limit (69 lb/yr) for mercury emissions is lower than the Subpart Da limit and that the recently submitted case-by-case MACT analysis has an even lower proposed limit. However, the higher Subpart Da value was used to provide conservative results for this analysis.

Modeling was conducted following standard DHEC methodology for Class II modeling analyses. The normalized emission impacts are based on a 1 g/s emission rate for each boiler (2 g/sec total). Those impacts are then scaled by the appropriate emission rate to yield the 24-Hour Impact. In this case, the concentration was scaled by the NSPS Subpart Da emission limit of 0.0264 pounds per hour (0.0033 g/sec) for the two boilers.

The potential facility emissions were modeled for sulfuric acid.

TOXIC AIR POLLUTANTS MODELING ANALYSIS					
Pollutant	**CAS Number**	**Normalized Concentration ($\mu g/m^3$)**	**24-hour Impact ($\mu g/m^3$)**	**Standard ($\mu g/m^3$)**	**% of Standard**
Mercury	7439-97-6	0.16 (1)	0.0003	0.25	0.1
Sulfuric Acid	7664-93-9	--	0.57	10.00	5.7
1) Normalized concentration is based on 2 g/sec (or 1 g/sec from each boiler). 24-hour impact = 0.16 $\mu g/m^3$ / 2 * 0.0033 g/sec					

<u>$PM_{2.5}$ Modeling</u>

$PM_{2.5}$ is regulated under section 110 of the federal Clean Air Act [Clean Air Act § 110, and 40 CFR § 50.13] and is therefore a regulated NSR pollutant as defined in South Carolina Regulation 61-62.5 Standard 2. However, EPA did not promulgate final $PM_{2.5}$ implementation rules until May 16, 2008. [73 FR 28321], which was after the draft PSD permit was issued (December 2007). Because of this, the Department did not have state or federal $PM_{2.5}$ implementation rules during the review of the permit application. As a result, the approach used for assessing $PM_{2.5}$ is discussed below.

While current regulations do not require $PM_{2.5}$ modeling, subsequent to issuance of the

Year	UTMX (km)	UTMY (km)	Normalized Emission Impacts ($\mu g/m^3$)	24-Hour Mercury Impacts ($\mu g/m^3$)	DHEC Standard No. 8 MAAC ($\mu g/m^3$)	% of Standard
1987	638.063	3755.566	0.14969	2.49E-04	0.250	0.10%
1988	640.453	3755.481	0.14309	2.38E-04	0.250	0.10%
1989	640.653	3755.281	0.14141	2.35E-04	0.250	0.09%
1990	640.553	3754.781	0.15959	2.65E-04	0.250	0.11%
1991	637.753	3755.381	0.15123	2.52E-04	0.250	0.10%
MAX	640.553	3754.781	0.15959	2.65E-04	0.250	0.11%

draft PSD permit, Santee Cooper and the Department have conducted ambient air quality modeling to assess the impact of the Pee Dee project on $PM_{2.5}$ concentrations. Predicted concentrations were compared with the primary and secondary $PM_{2.5}$ NAAQS. (The primary and secondary standards are identical. EPA has not yet issued PSD increments for $PM_{2.5}$, therefore, the $PM_{2.5}$ NAAQS are the only $PM_{2.5}$ ambient limits currently available for direct comparison with modeling results.

The $PM_{2.5}$ modeling evaluations were performed assuming that $PM_{2.5}$ emissions from the proposed coal boilers and crushers are equal to total estimated PM_{10} emissions including condensables. The remaining sources were modeled using available $PM_{2.5}$ emission factors and rates. This is obviously a conservative approach and helps reduce the possibility that $PM_{2.5}$ impacts were underestimated.

Modeling results were compared to the $PM_{2.5}$ NAAQS which are an annual average of 15 µg/m^3 and a 24-hour average of 35 µg/m^3 (achieved when the 98th percentile 24-hour concentration is less than or equal to the standard). Santee Cooper reported predicted concentrations from the modeling evaluations of 0.65 µg/m^3 for the annual average (highest annual average of the five modeled years), and 3.60 µg/m^3 for the 24-hour average (highest three year rolling average of the 98th percentile concentrations). Santee Cooper reported total concentrations, including representative background concentrations from the Department's Winyah monitoring station, of 13.6 ug/m^3 (annual) and 34.4 ug/m^3 (24-hour average). The Department reviewed the modeling results submitted by Santee Cooper and reran the modeling to verify the results. The predicted $PM_{2.5}$ concentrations obtained by the Department were 0.7 ug/m3 for the annual average (highest annual average of the five modeled years) and 5 ug/m^3 for the 24-hour average (highest second high for the five modeled years, which is more conservative than the 98th percentile concentration used by Santee Cooper). Total concentrations obtained by the Department, including background concentrations from the H L Sneed Middle School monitoring station, were 13.3 ug/m^3 (annual) and 34 ug/m^3 (24-hour average). Both methods produced results that are below the respective $PM_{2.5}$ NAAQS for each averaging period. [Note: Santee Cooper reviewed monitoring data from the two closest $PM_{2.5}$ monitoring stations operated by the Department for their analysis. The H L Sneed Middle School station is the closest to the proposed facility and is more representative meteorologically, but Santee Cooper chose to use data from the Winyah station in their analysis because it is slightly more conservative for the 24-hr standard (the annual average calculated by Santee Cooper for both stations was 12.9 ug/m^3). Santee Cooper did not realize, however, that the data posted on the Department's web site included data for a partial year of monitoring at the Winyah site and should not be used for modeling analyses. The Department used data from the H L Sneed Middle School site, a suburban site just outside the Florence city limits, as a conservative background for the rural Santee Pee Dee facility location. The Department used the annual three year design value for the Sneed site as the annual background concentration rather than the three-year arithmetic average used by Santee Cooper in order to match the form of the $PM_{2.5}$ annual NAAQS. The annual design value for the Sneed site is slightly lower, at 12.6 ug/m^3, than the 12.9 ug/m^3 number calculated by Santee Cooper.]

PM 2.5 AMBIENT AIR QUALITY MODELING ANALYSIS							
Pollutant	**Averaging Time**	**Model Used**	**Maximum Modeled Concentration (µg/m^3)**	**Background Concentration (µg/m^3)**	**Total (µg/m^3)**	**Standard (µg/m^3)**	**% of Standard**
$PM_{2.5}$	24 Hour	AERMOD	5.0 (1)	29.0 (2)	34.0	35	97
	Annual	AERMOD	0.7 (3)	12.6 (2)	13.3	15	89
1) 24-hour averaging time is based on highest second high over each of the five years (more conservative than 98th percentile).							

2) Based on the 2005-2007 three year design value for the Sneed site.
3) Annual averaging time is based on highest first high.

PM10 Additional Modeling

It is important to note some general concepts regarding the PM_{10} increment modeling before addressing each of the concerns.

- The material handling sources (with the exception of those routed to a control device) are low-level releases from storage piles or material drop points and are modeled without a release velocity. Due to the poor dispersion characteristics of these sources, they are not well-mixed within the atmosphere, leading to higher impacts near their release location. As a result, these sources account for a majority of the modeled impacts on the highest impact days.
- Increment analyses are allowed to be based on actual emissions. In this case, however potential emission rates, not actual emissions, were modeled for all sources, yielding higher modeled impacts than would actually be expected to occur. Therefore, the increment analyses provide a conservative estimate of impacts.
- The highest impacts predicted by the model are isolated to the area immediately adjacent to the plant. The impacts drop off sharply with distance from the facility. When compared to the 24-hr increment of 91 $\mu g/m^3$, only four receptors exceed 26 $\mu g/m^3$ and only twelve receptors exceed 20 $\mu g/m^3$. The worst-case impacts for all other years are below 25.2 $\mu g/m^3$.
- The material handling sources were assumed to operate at the maximum short-term production capacity for 8,760 hours per year. This results in an overestimation of emissions for the following reasons:
  - The material handling equipment will not typically operate at its maximum production rate (i.e., the equipment capacity). The two boilers could not process the amount of material that the material handling equipment could generate at the maximum production rate over a long period of time.
  - The material handling equipment does not operate 24 hours per day and, for safety reasons, typically does not operate in the night-time hours. Although Santee Cooper cannot control when coal trains arrive, and therefore may need to unload a train at night, other material handling activities such as loading the coal silos from the coal piles will usually take place during the day. Night-time hours generally produce the highest modeled ambient impacts from low-level emission sources due to atmospheric stability at that time.
  - The generation of emissions from both storage piles and material transfer points is based on wind speed. Storage pile emissions will occur only when wind speeds exceed approximately 12 miles per hour (mph), [Kinsey, J. and Cowherd, C., "Fugitive Emissions" in Buonicore, A. and Davis, W., eds., *Air Pollution Engineering Manual*, Van Nostrand Reinhold, 1992.] but these emissions were modeled at every hour. The worst-case impacts from the

storage piles occur at low wind speeds due to reduced dispersion. During these low-wind speed hours, there will be no actual emissions from storage piles, but the model conservatively predicts the highest impacts during these hours. Specifically, during the 24-hour period with the highest impact for the five-year period modeled (November 15, 1990), the wind speed never exceeded the 12 mph threshold. The average speed for that 24-hour period is 4.25 mph excluding calm hours and 3.19 mph including calm hours. The maximum wind speed during this 24-hour period is 9.17 mph. Therefore, although minimal (if any) emissions of wind-generated PM would actually be created, the modeled impacts from storage piles are still considered.

- In addition to the storage piles, the material transfer emissions will be lower during periods of low wind speeds. However, these emissions are assumed to be the same each hour regardless of wind speed.
- No control efficiency was included for watering of the storage piles and material transfer points. The piles will be routinely watered, and emissions reductions from watering can be as high as 90%.[Kinsey, J. and Cowherd, C., "Fugitive Emissions" in Buonicore, A. and Davis, W., eds., *Air Pollution Engineering Manual*, Van Nostrand Reinhold, 1992.], [EPA AP-42, Section 13.2.4 Aggregate Handling and Storage Piles, November 2006.]
- The control efficiency for dust collectors on the material handling sources is conservatively assumed to be 99%. The control efficiency expected to be achieved in practice will likely be above 99.9%.
- Each cooling tower was modeled using the original proposed PM_{10} emission rate of 4.66 lb/hr, based on 0.005% drift loss. The revised draft permit limit is now based on 0.0005% drift loss, resulting in a new PM_{10} emission rate of 0.466 lb/hr for each cooling tower.

Santee Cooper conducted additional modeling using the assumption that winds were stronger than 12 mph 13.21% of the time. As shown below, the modeled 24-hr impacts would still remain below the standard of 30 μg/m^3, even using all of the conservative assumptions noted above (including, in particular, the use of a value for cooling tower drift loss that is ten times higher than the revised design value).

High 2nd High 24-Hr Impact	**Contribution from Storage Piles**	**Factor increase due to emission factor change**	**Revised Storage Pile Contribution**	**Revised Total**	**Class II Increment**
μg/m^3	**μg/m^3**		**μg/m^3**	**μg/m^3**	**μg/m^3**
27.9	4.6	1.36	6.3	29.6	30